# Quick Overview of Research

### Sebastian Scherer http://theairlab.org at the Field Robotics Center

**Carnegie Mellon University** 

## Aerial Robotics Today

#### Urban Air Mobility (UAM)

Electric Autonomous Passenger Air Vehicles

Why autonomous? => Too many pilots required, payload, and density of traffic.





Sebastian Scherer, Carnegie Mellon University, http://theairlab.org

#### **Drone Delivery**

Big challenge: Beyond visual line-of-sight and integration with other traffic.

Detection, reacting to other traffic, naturally fitting into existing traffic flow, incorporating wind into decision making.



Search & Rescue, Inspection, and Filming

Challenging flight conditions, low-light, dust, fog.

Coordination between different types of robots, flight close to obstacles.



## + Offroad Driving



		Works well in well-lit	Requires hand- engineering behaviors
Accurate but not robust		images and with large	and parameters,
		objects	decisions brittle, comms
	SLAM	Visual Detection	Coordination & Decision Making
	End-to-end Learnin & Simulators	g Formal Safety Guarantees	Motion Planning
Lack of generalization to		Traditionally guarantees are too conservative for	Hand-tuning for multiple objectives, fails
the real-world		true autonomy especially for flight	to address problems such as wind



## Examples for Increasing the Amount of Adaptation in Robotics





Learning a





Sebastian Scherer, (

## What Are We Looking for in a Student?

- Not afraid to solve big problems
- Not afraid to get your hands dirty
- Expected to broaden and deepen horizon
- Enjoys solving "dirty" problems and thinking about how to make them "clean"



Meet & Greet Sessions

• Still organizing session. Please sign up via Roboguide advisor match. This is the google form:

https://forms.gle/JXND3VWYwfgavTTX6

- Will contact people that sign up with teams.
- Expect time to be Tuesday or Wednesday next week.
- Plan on 5min. Getting to know each other, questions, etc.